#689 A Comparison of Selected Gait Parameters in Nulliparous Females With and Without Urinary Urgency: A Pilot Study

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INTRODUCTION

Lower urinary tract symptoms (LUTS) are primarily considered a problem for older women; however, young, nulliparous women can experience problems with stress urinary incontinence (SUI), urgency urinary incontinence (UUI), and symptoms of overactive bladder syndrome (Ural et al. 2021).

Alterations of gait patterns have been identified in college-aged women with SUI (Hartigan et al. 2020). This is the first study looking at specific gait parameters nulliparous college-aged women with urgency or UUI to age-matched women without any urinary symptoms.

METHODS

This descriptive study is part of a larger data set that was collected to review gait biomechanics with nulliparous young women in graduate school. A total of 58 participants completed the data collection. Ten of the 58 participants had complaints of urgency or UUI. An additional 10 participants without any complaints or significant medical history were age-matched to the participants with urge-related complaints.

The inclusion criteria were as follows: nulliparous and female. The exclusion criteria were the following: male, ambulation with an assistive device, younger than 18 years of age, and a history of pelvic, lower extremity, back, or abdominal surgery in the last six months.

Data were collected on the Vicon Vero 2.2 Motion Analysis System (Vicon, Oxford, UK) sampling at 100 Hz integrated with two force plates (Advanced Medical Technology, Inc., Watertown, MA, USA) (45.7 cm x 50.8 cm) sampling at 2 kHz. Participants completed a minimum number of 16 walking trials to ensure good force plate contact for at least three trials.

FIGURE 1. Plug-in Gait marker set.

Selected spatiotemporal, kinetic, and kinematic values were processed using the Plug-in Gait Model within the Nexus processing system (Vicon, Oxford, UK). For missing markers in model reconstruction, cyclic filling, rigid body filling, and pattern filling were used to fill any gaps before processing the Plug-in Gait Model.

Means and standard deviations for gait speed, cadence, and step width were reported for both groups and then were analyzed with an Independent sample *t*-test. Means were calculated for hip abduction moment at weight acceptance and hip external rotation angle at weight acceptance. Independent sample *t*-tests were utilized for comparisons of both kinetic and kinematic values. The paired *t*-test was used for between-limb comparisons between the right and left lower extremities for step width in the urinary urgency group. Data were analyzed with IBM SPSS Statistics Version 27 (IBM Corp, Armonk, New York).

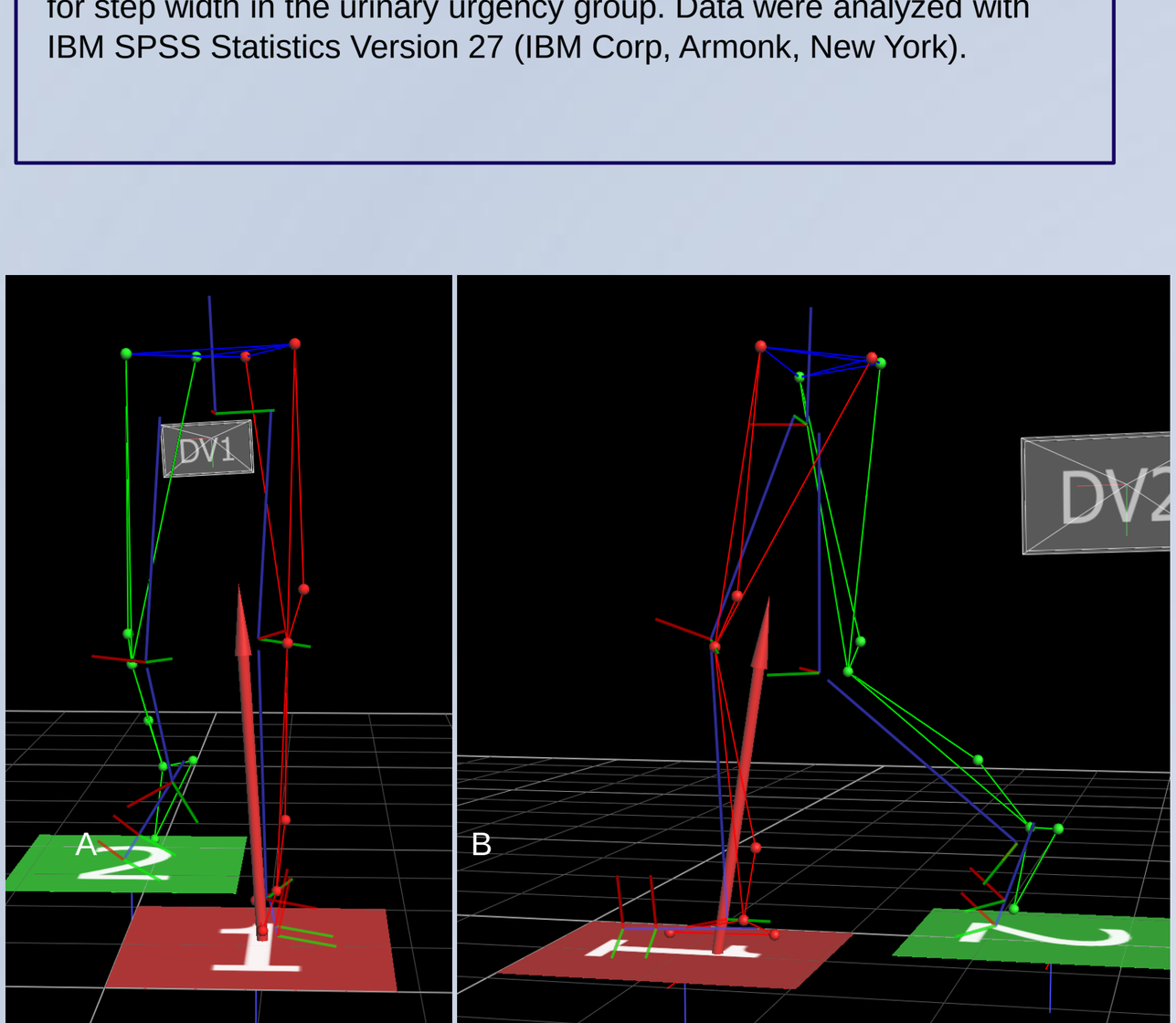

FIGURE 2. Frontal (A) and sagittal (B) view of Plug-in Gait output and ground reaction force.

RESULTS

Twenty female participants completed gait analysis with ten of these being participants with symptoms of urgency or urge incontinence and ten without. One participant from each group was excluded due to data collection errors. Notable differences in the urgency group include a greater percentage of constipation, urge incontinence, stress incontinence, irregular menses, irritable bowel syndrome, and recurrent urinary tract infections. Notable differences for the group without complaints were a higher percentage of scoliosis. Both groups had the same percentage reporting abdominal cramping and also had sought physician care for lower extremity orthopedic injuries, although those with urgency were slightly higher. Although not included in Table 1, the urgency participated in exercise varying times through the week: 1-2 times (33.3%), 3-4 (33.3%), > 4 (33.3%), while those without were as follows: 1-2 (22.2%), 3-4 (22.2%), > 4 (55.5%).

There were no significant differences for the comparisons between groups for cadence (p = 0.981), step width (p = 0.211), gait speed (p = 0.470), mean hip abduction moment at weight acceptance (p = 0.101), and hip external rotation angle at weight acceptance (p = 0.072). There was no significant difference in the between limb comparison for step width (p = 0.150) for those with urgency.

TABLE 1	With urgency or urge UI (n = 9)	Without urgency or urge UI (n = 9)
Age (years)	23.33 (1.6580	23.44 (1.878)
BMI	22.54 (4.860)	22.99 (3.992)
Constipation	33.33%	11.1%
Urgency	100%	0%
Urge Incontinence	22.22%	0%
Stress Incontinence	11.11%	0%
Abdominal Cramping	22.22%	22.22%
Scoliosis	11.11%	22.22%
Irregular Menses	22.22%	0%
UTI	22.22%	0%
IBS	11.11%	0%
Pelvic injury	0%	0%
Pelvic surgery	0%	0%
Pelvic pain	0%	0%
Physician care for LE ortho	55.55%	44.44%

TABLE 2	With urgency or urge UI (n = 9) Mean (SD)	Without urgency or urge UI (n = 9) Mean (SD)	Comparison P*, d**, (CI 95%)
Cadence	111.66 (9.777)	112.43 (9.044)	0.981*; -0.769**; (-10.181 to 8.642)
Step Width	13.66 (1.510)	15.11 (2.962)	0.211*; -1.444**; (-3.793 to 0.906)
Gait Speed	1.11 (0.073)	1.11 (0.100)	0.470*; 0.087**; -0.089 to 0.085
Hip Abduction Moment at WA	181.304 (208.351)	177.859 (115.844)	0.101*; 3.445** -168.042 to 174.832
Hip External Rotation Angle at WA	-27.021 (12.379)	-26.672 (25.606)	0.072*; -0.348**; -21.605 to 20.586

CONCLUSIONS

This is the first study to observe gait in nulliparous women with urgency and UUI. Both groups are very closely matched with BMI and age. The selected measures were based on previous literature looking at a similar population of college-aged women comparing those with SUI and without (Hartigan et al. 2020). Hartigan et al's significant findings were at weight acceptance and also focused on differences between dominant and non-dominant limbs of those with SUI, and this served as guidance in the selection of parameters for this study. Limb dominance was not asked for the participants in this study and could potentially impact the results.

Although there were no significant findings between the urgency group and the age-matched comparisons for these specific measures, other kinematic and kinetic aspects of the gait cycle such as mid-stance and toe-off may be affected in those with urgency. Based on the literature review, there have been descriptive studies of young college-aged women with LUTS, but there have been limited studies regarding on how these symptoms impact the biomechanics of gait, which requires further study.

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